@isadorachristel

MED-GOLD

Living Lab 2021
17/06/2021

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

EXCELENCIA SEVERO OCHOA

Visualising climate services

Isadora Christel Jiménez

Head of Knowledge Transfer team, Earth Sciences Department

Building on the knowledge of **many BSC colleagues**: Marta Terrado, Dragana Bojovic, Diana Urquiza, Konstantina Chouta, Andria Nicodemou, Sara Octenjak, Jose Canovas, Miguel Segura, Marina Conde, Ilaria Vigo, Asun Lera St. Clair, Luz Calvo, Guillermo Marin, Fernando Cucchietti

1990

SO, THIS CLIMATE CHANGE THING COULD BE A PROBLEM..

1995

CLIMATE CHANGE: DEFINITELY A PROBLEM.

2001

YEP, WE SHOULD REALLY BE GETTING ON WITH SORTING THIS OUT PRETTY SOON...

2007

LOOK, SORRY TO SOUND LIKE A BROKEN RECORD HERE...

2013

WE REALLY HAVE CHECKED AND WE'RE NOT MAKING THIS UP.

2019

IS THIS THING ON?

TAP TAP TAP

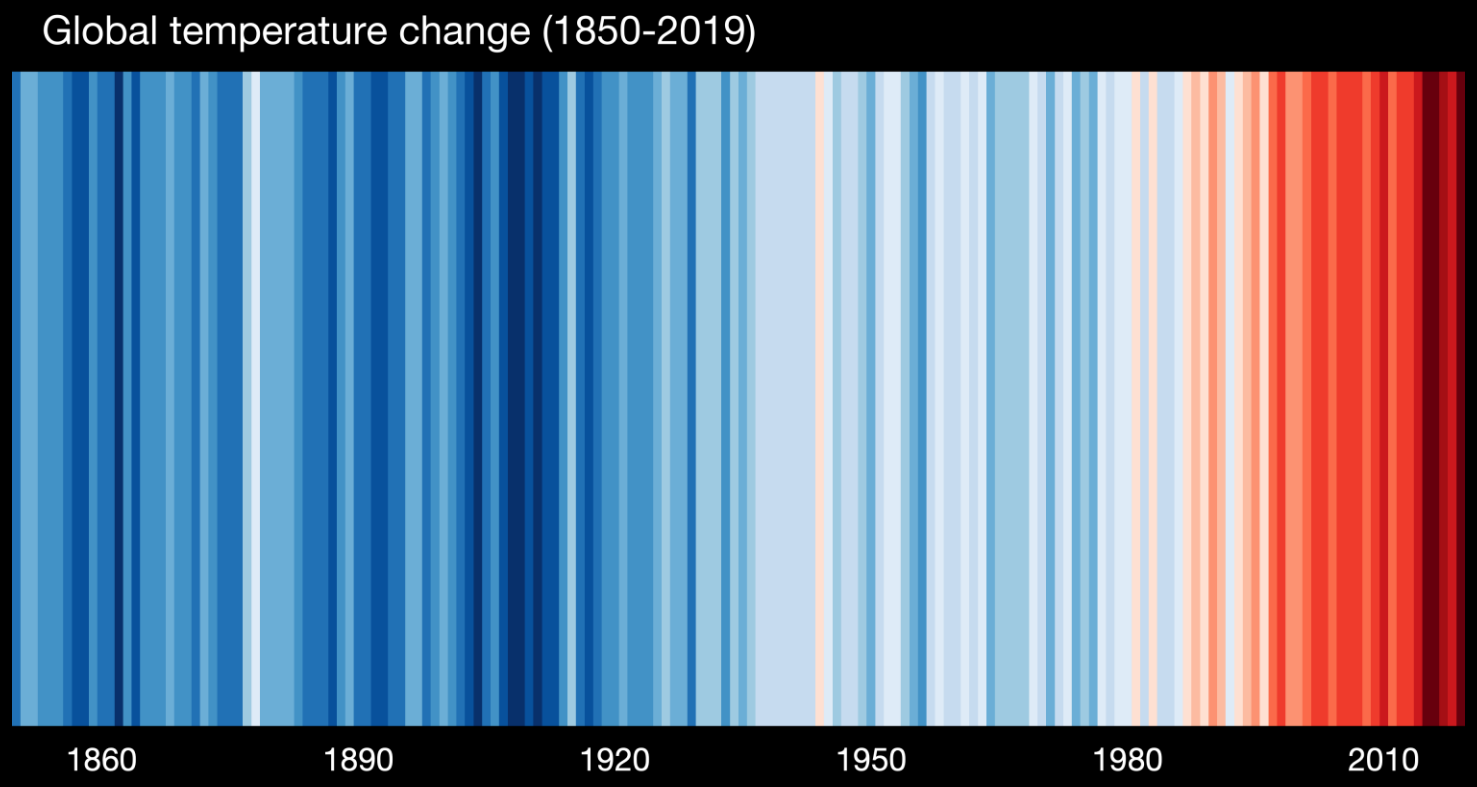
KUDRNA. 28/9/13

There is
NO Planet B

GRETA
THUNBERG
NO ONE
IS TOO SMALL
TO MAKE
A DIFFERENCE
NO ONE IS TOO SMALL TO MAKE A DIFFERENCE
GRETA THUNBERG

NARRATIVES

VISUALS #ShowYourStripes



VISUALS

#ShowYourStripes

Córdoba 1901-2018

Not only for
broad audiences...

Policy makers

Industry

Civil protection

... and many more

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

Engage them
Raise Awareness
Trigger action

ACTIONABLE INFORMATION

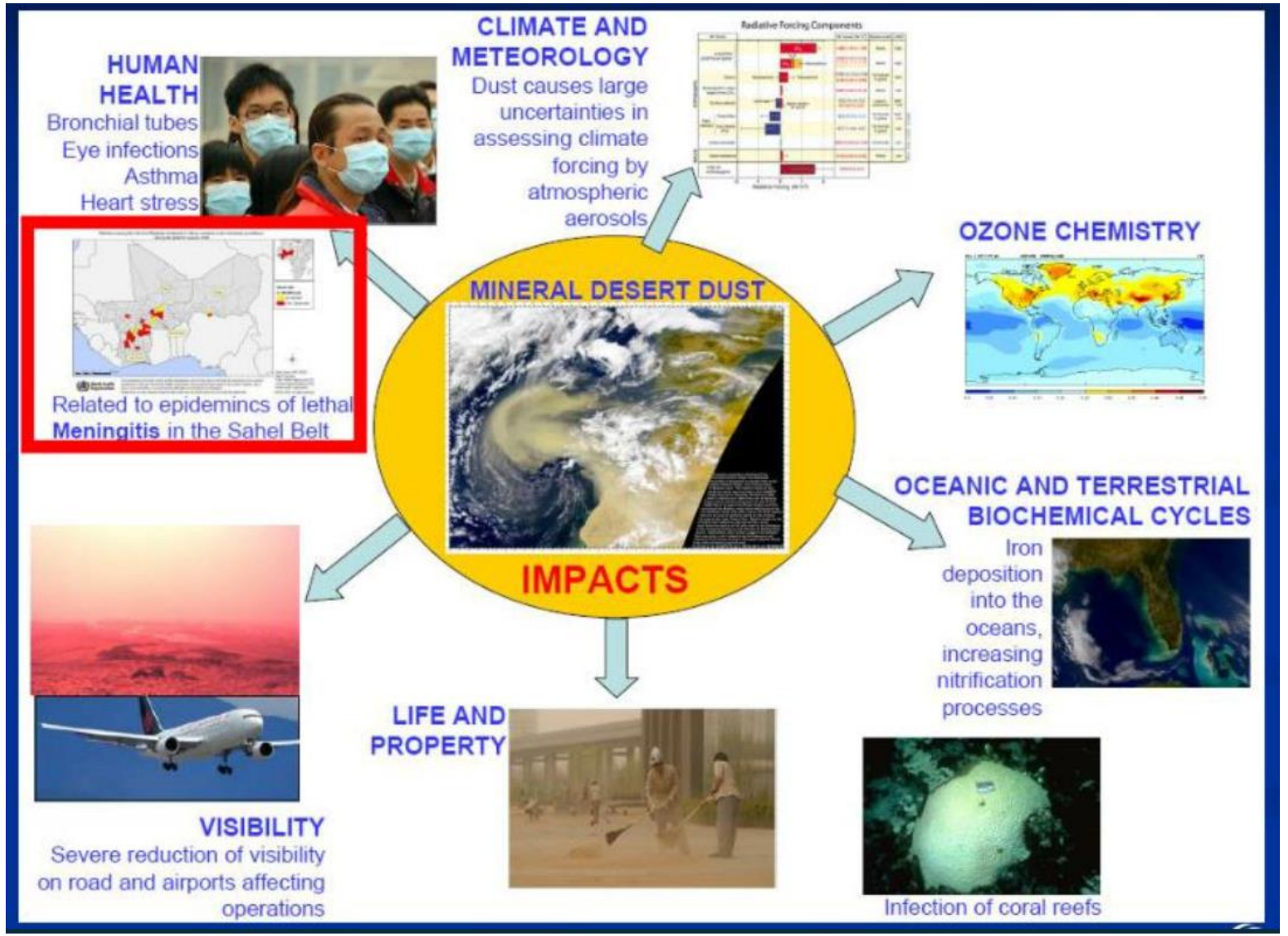
Climate services need a Transdisciplinary approach

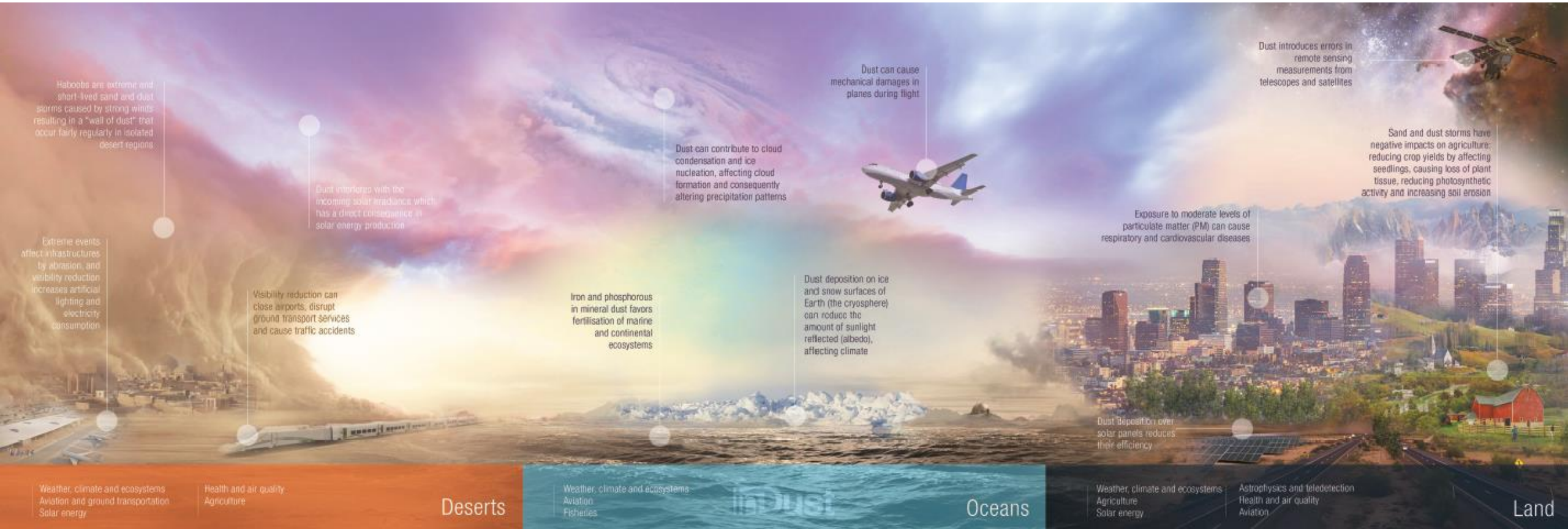
1. Design

Design is ALL around but we only realise when it FAILS

WOW factor... Aesthetics also matter

We all have
Unconscious biases

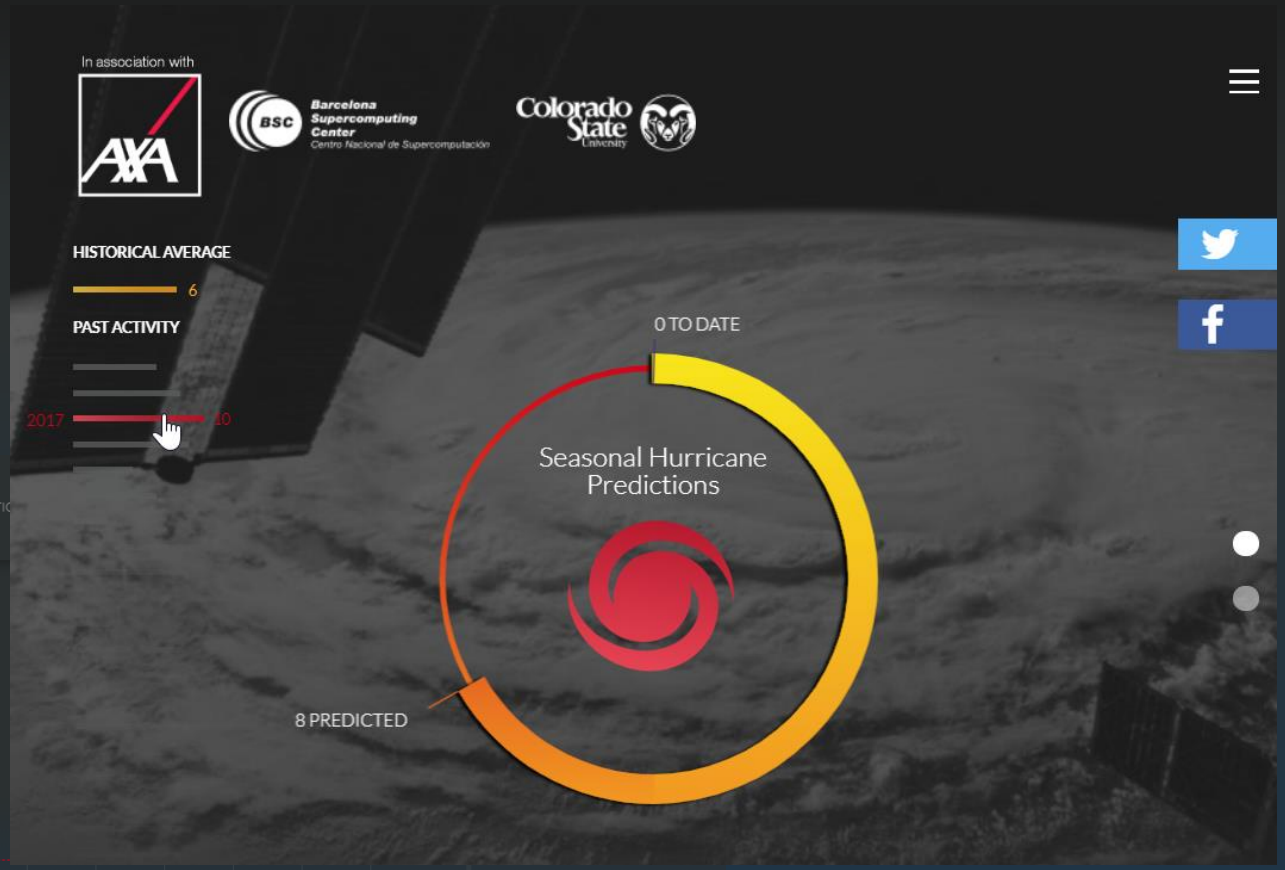

HUMAN HEALTH
Bronchial tubes
Eye infections
Asthma
Heart stress
Related to epidemincs of lethal Meningitis in the Sahel Belt
CLIMATE AND METEOROLOGY
Dust causes large uncertainties in assessing climate forcing by atmospheric aerosols
Radiative Forcing Components
MINERAL DESERT DUST
IMPACTS
OZONE CHEMISTRY
OCEANIC AND TERRESTRIAL BIOCHEMICAL CYCLES
Iron deposition into the oceans, increasing nitrification processes
LIFE AND PROPERTY
Infection of coral reefs
VISIBILITY
Severe reduction of visibility on road and airports affecting operations

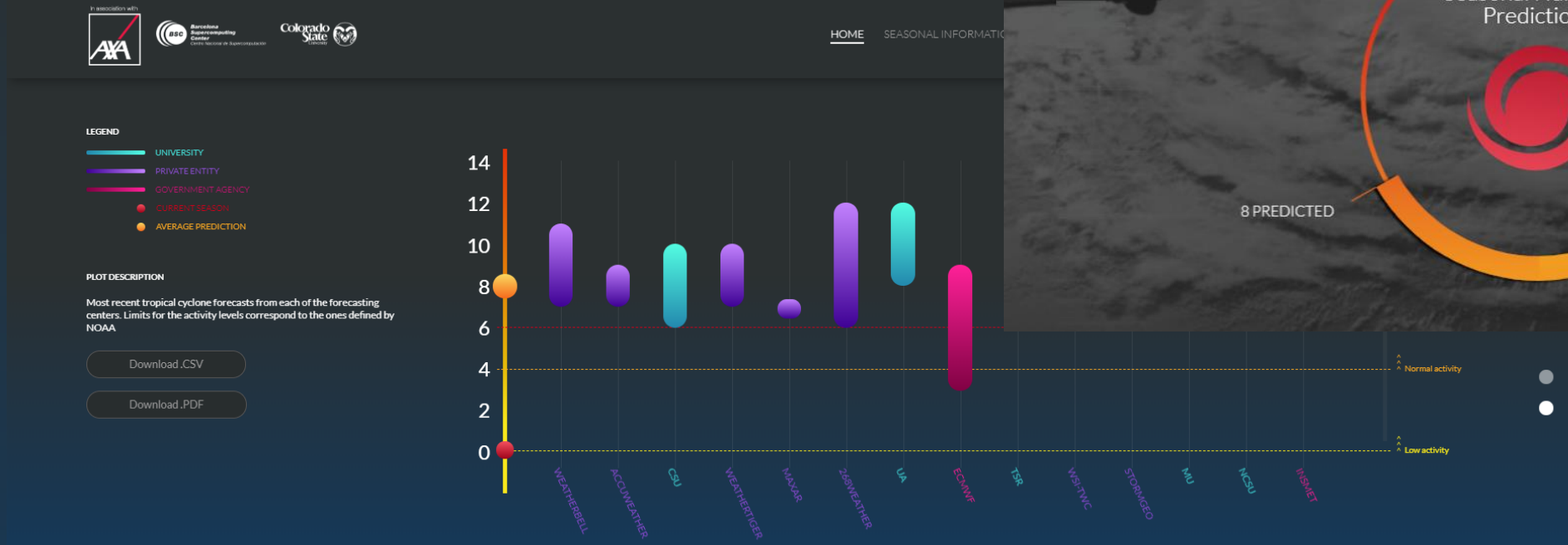


Barcelona Supercomputing Center
Centro Nacional de Supercomputación

https://cost-indust.eu/media-room/resources

www.seasonalhurricanepredictions.org



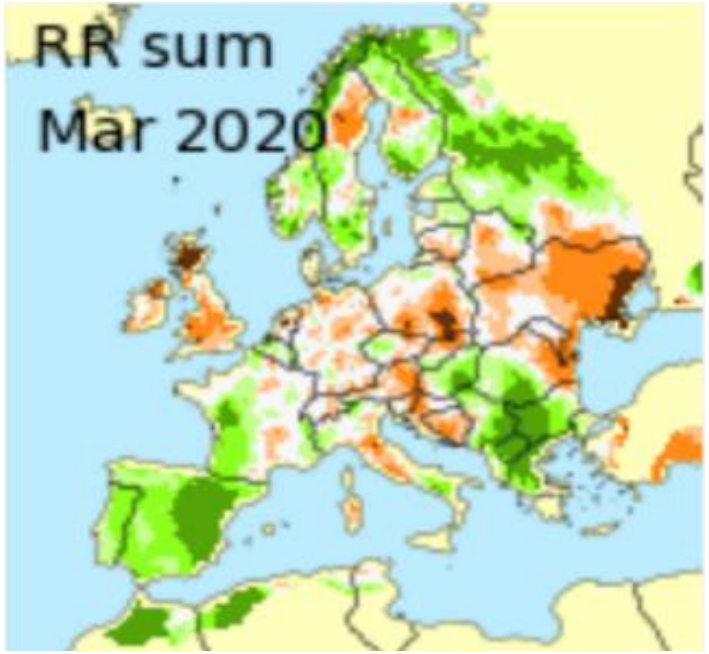


FORECAST EXPLANATION

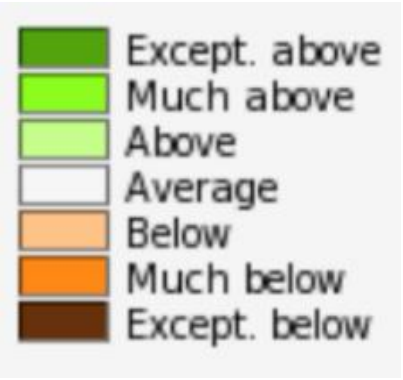
The Atlantic hurricane season begins on 1 June, and over one dozen groups have already issued seasonal hurricane forecasts for the 2020 season. To date, most groups have predicted an above-average season, with several forecasting an extremely active season (e.g., 9+ hurricanes). The spread in these early season predictions is somewhat less than we have seen in recent years. Several months

season historically ramps up in August, and consequently, significant alterations in seasonal forecasts are possible. For example, if the tropical Pacific were to anomalously warm and tropical Atlantic SSTs were to anomalously cool, seasonal forecasts would likely decrease. Alternatively, if La Niña appeared more likely and the tropical Atlantic remained warmer than normal, seasonal forecasts could be

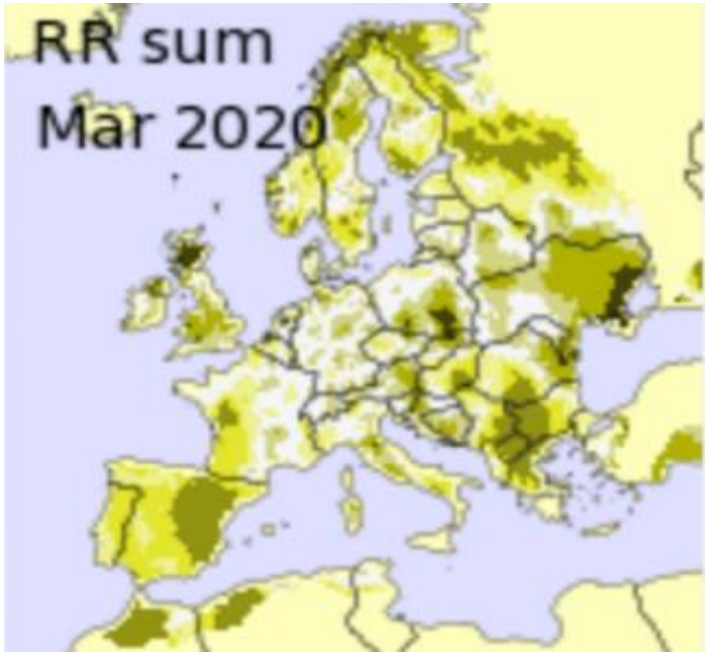
1. Design
2. **Color**

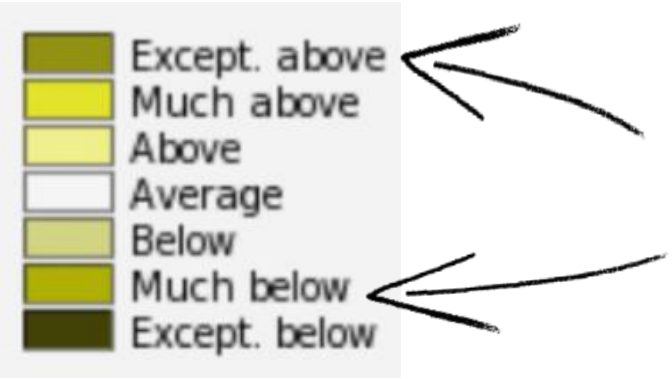


Usual color scale for precipitation

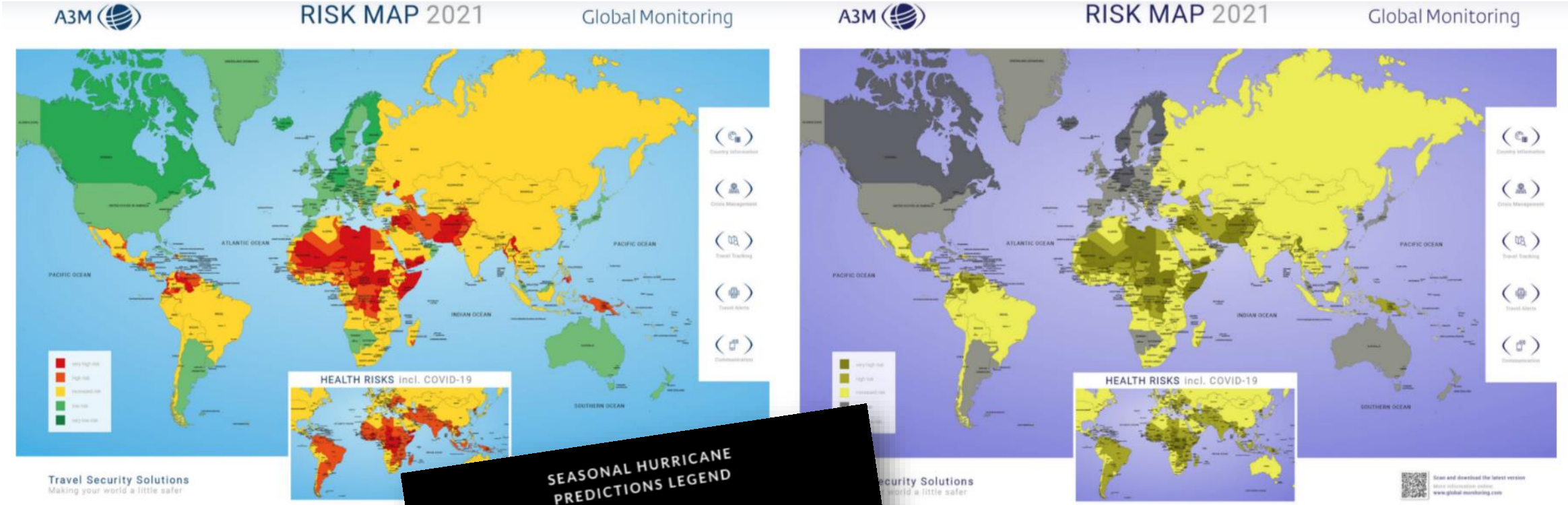


Build color-blind friendly products





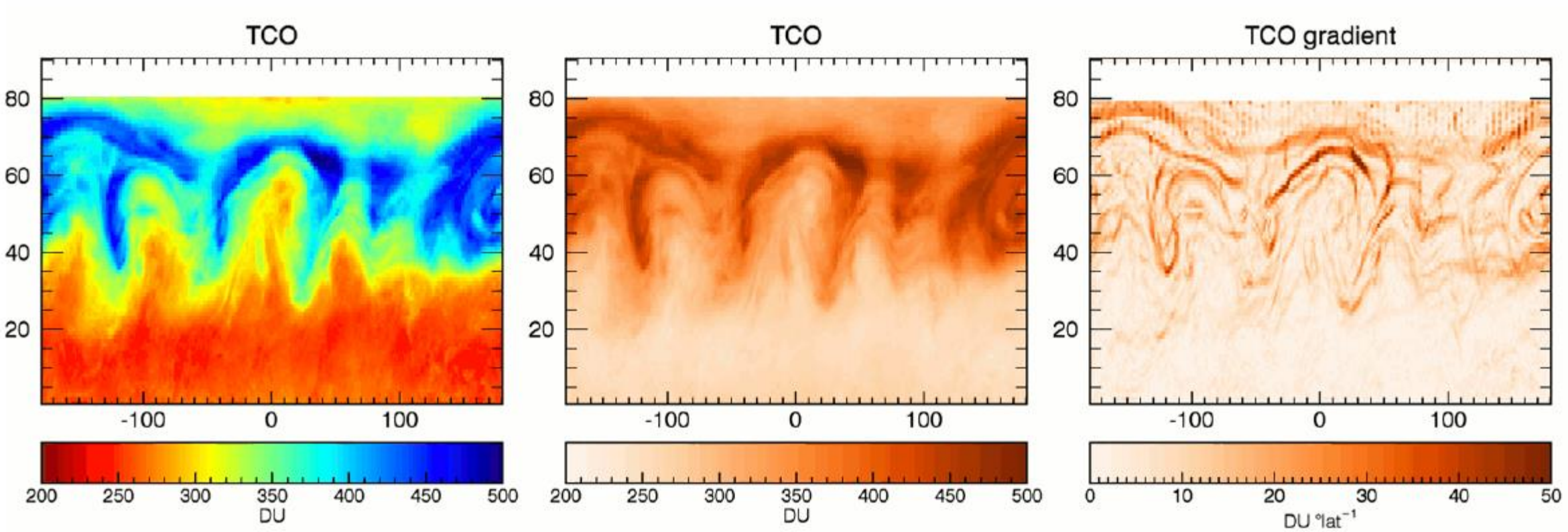
Color-blind simulation



Normal practice does not mean good practice

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

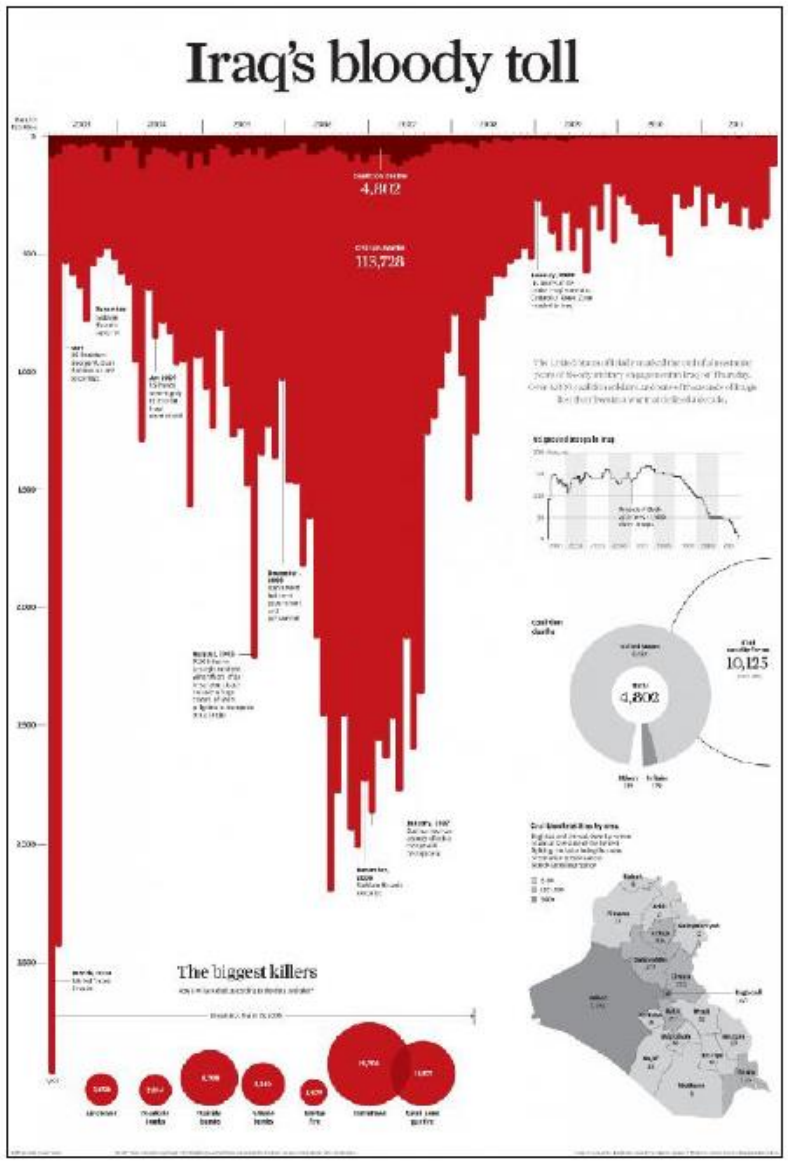
Wrong color scale can show effects not present in data

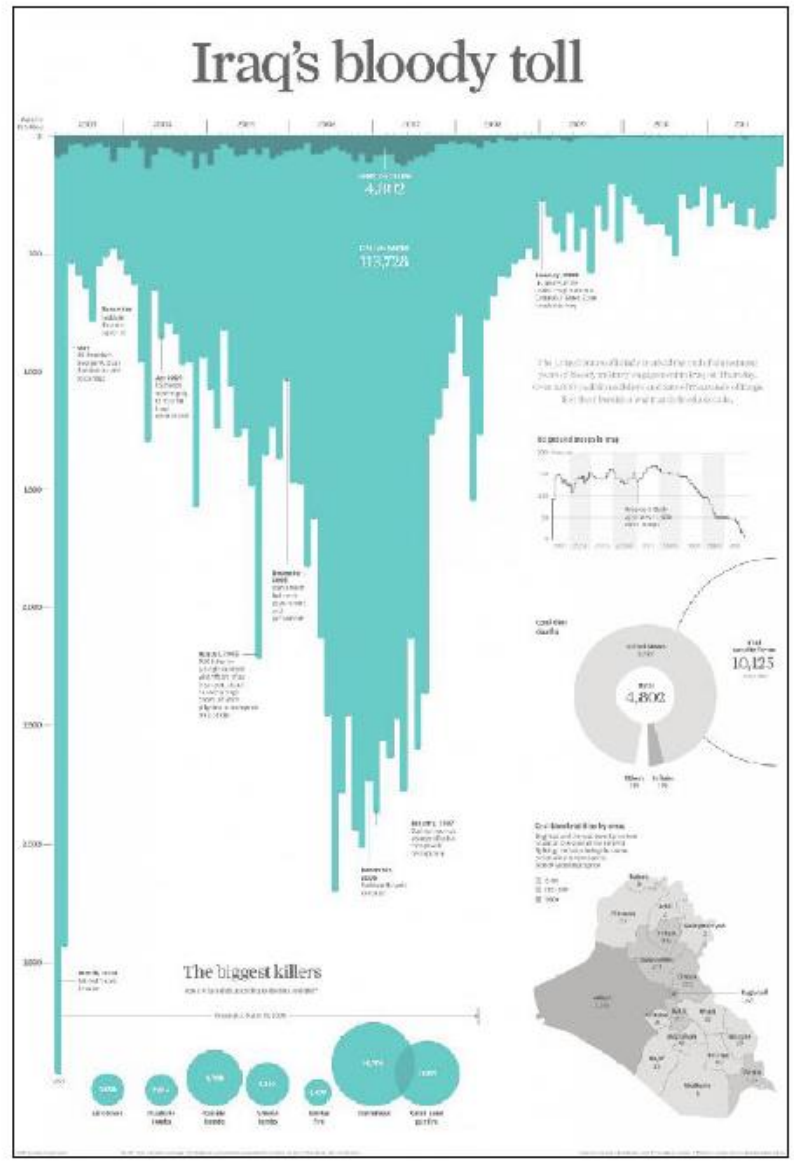


Learn more at: https://www.climate-lab-book.ac.uk/2014/end-of-the-rainbow/

Sean Davis, NOAA

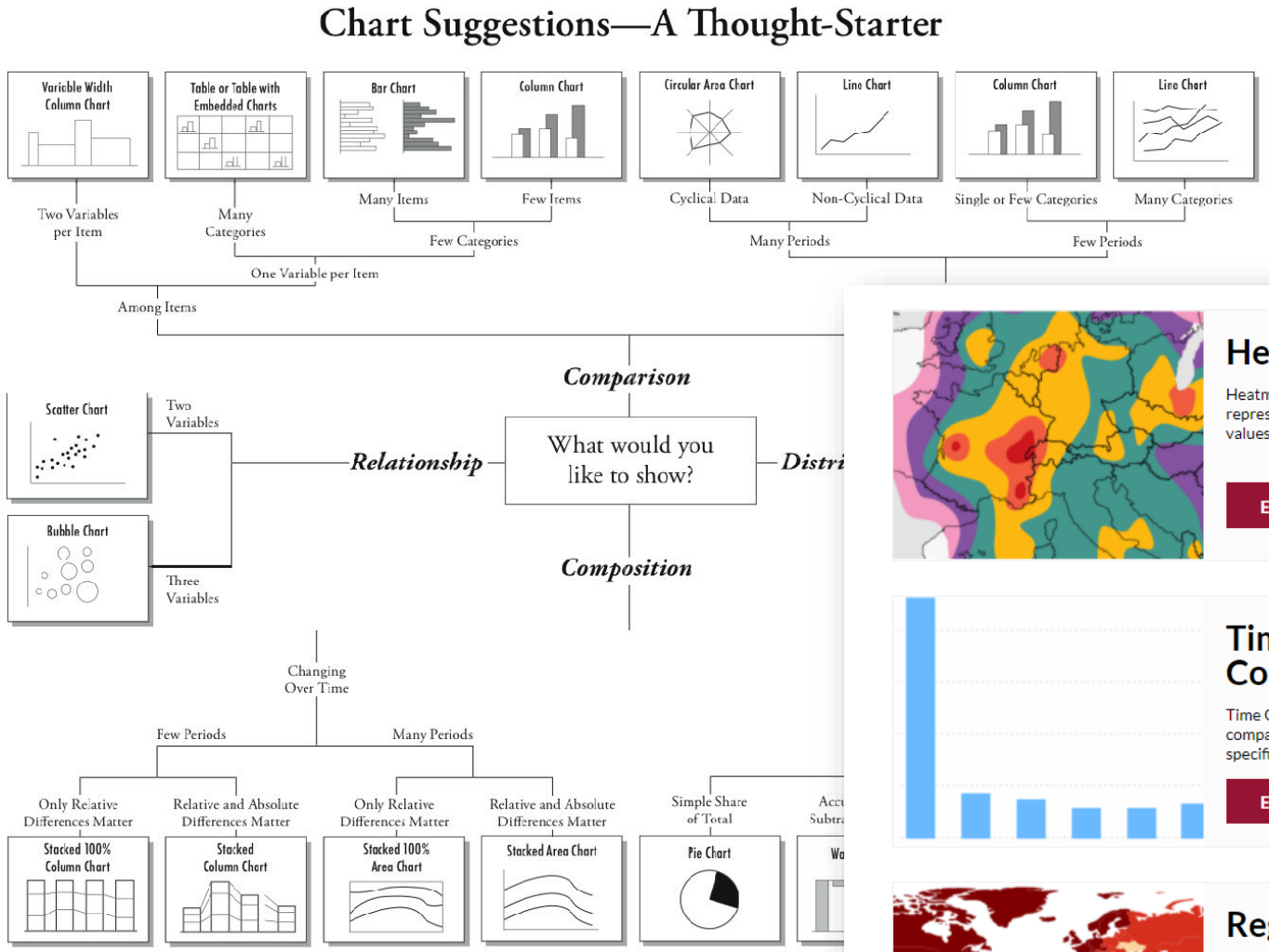
Colors may also have **meaning**

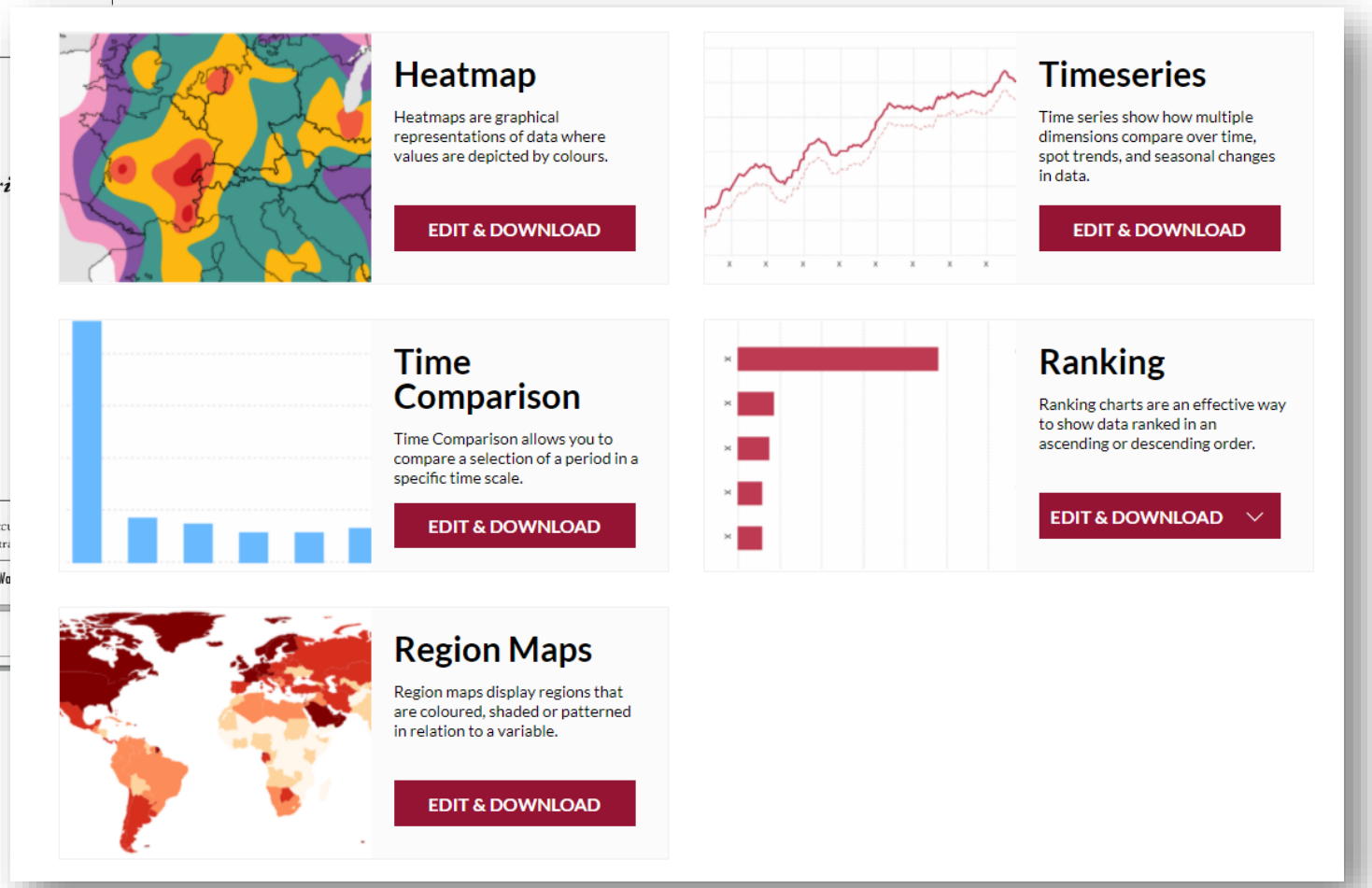




1. Design
2. Color
3. Visual encoding

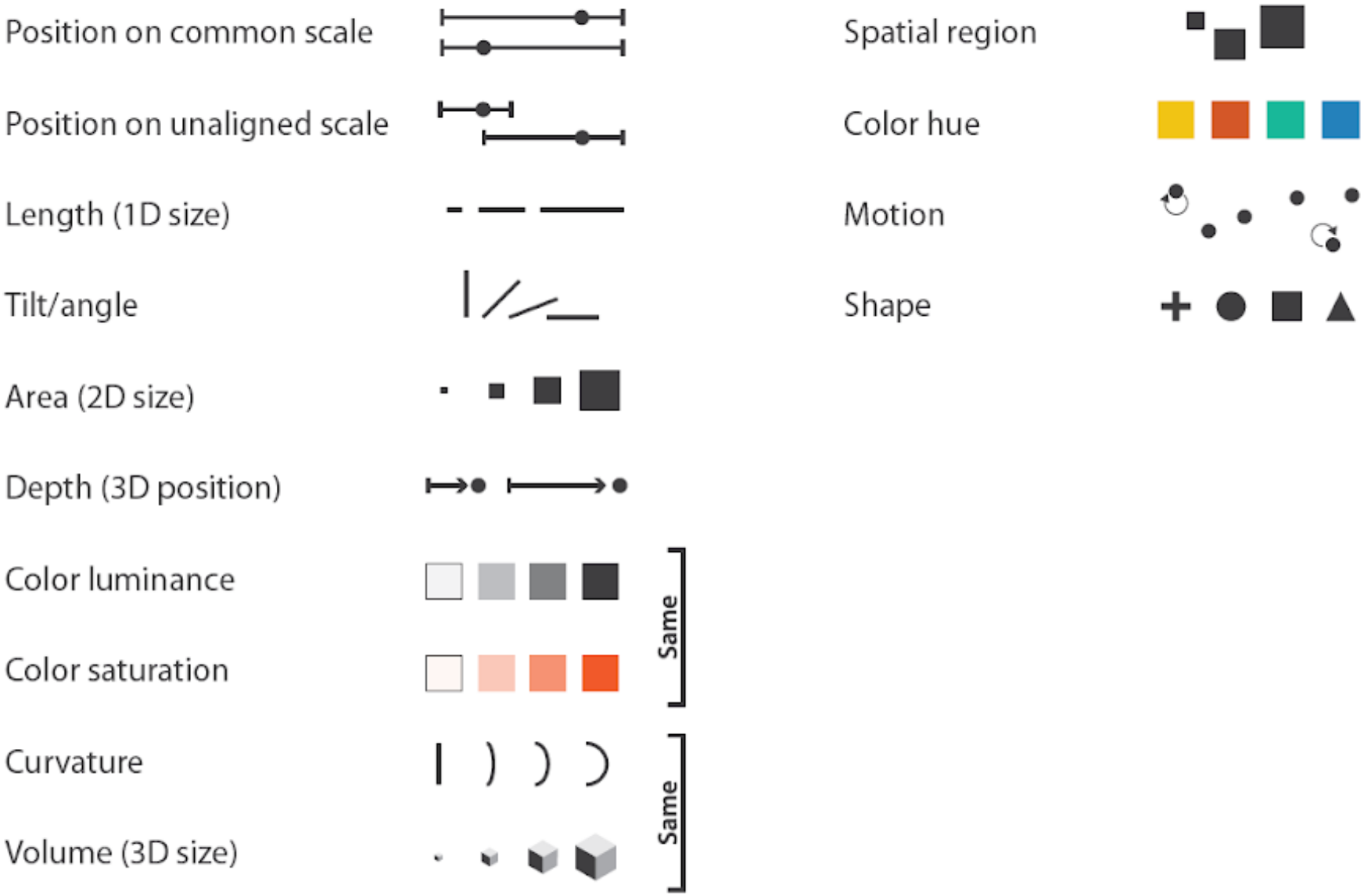
Type of data and type of product





Barcelona Supercomputing Center
Centro Nacional de Supercomputación

www.climate.copernicus.eu/press-data-portal



from The Truthful Art. Cairo, A.

Not all encoding is equally good...

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

www.project-ukko.net

Less is more

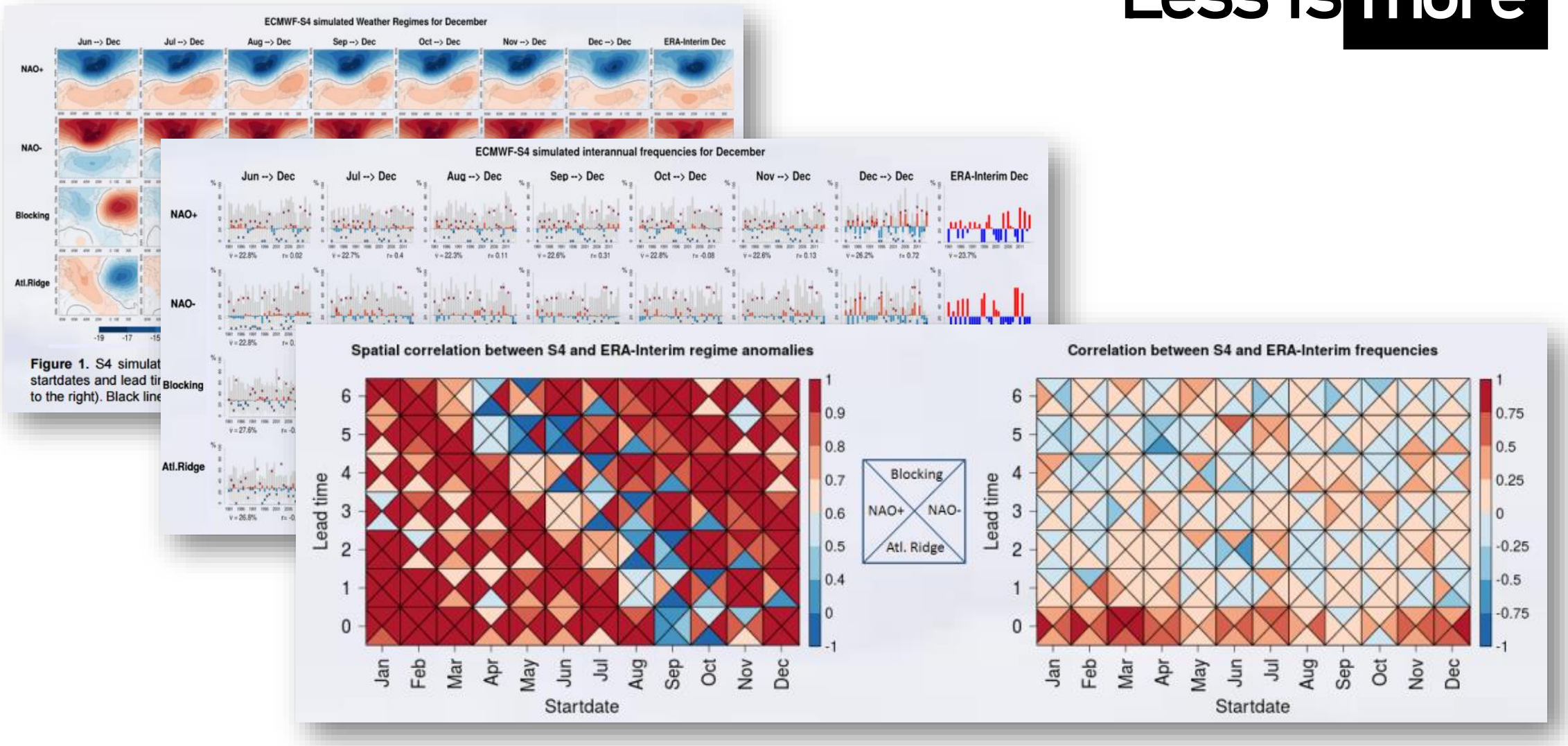


Figure 1. S4 simulat
startdates and lead ti
to the right). Black line

1. Design
2. Color
3. Visual encoding
4. Interacting with information

Two key concepts

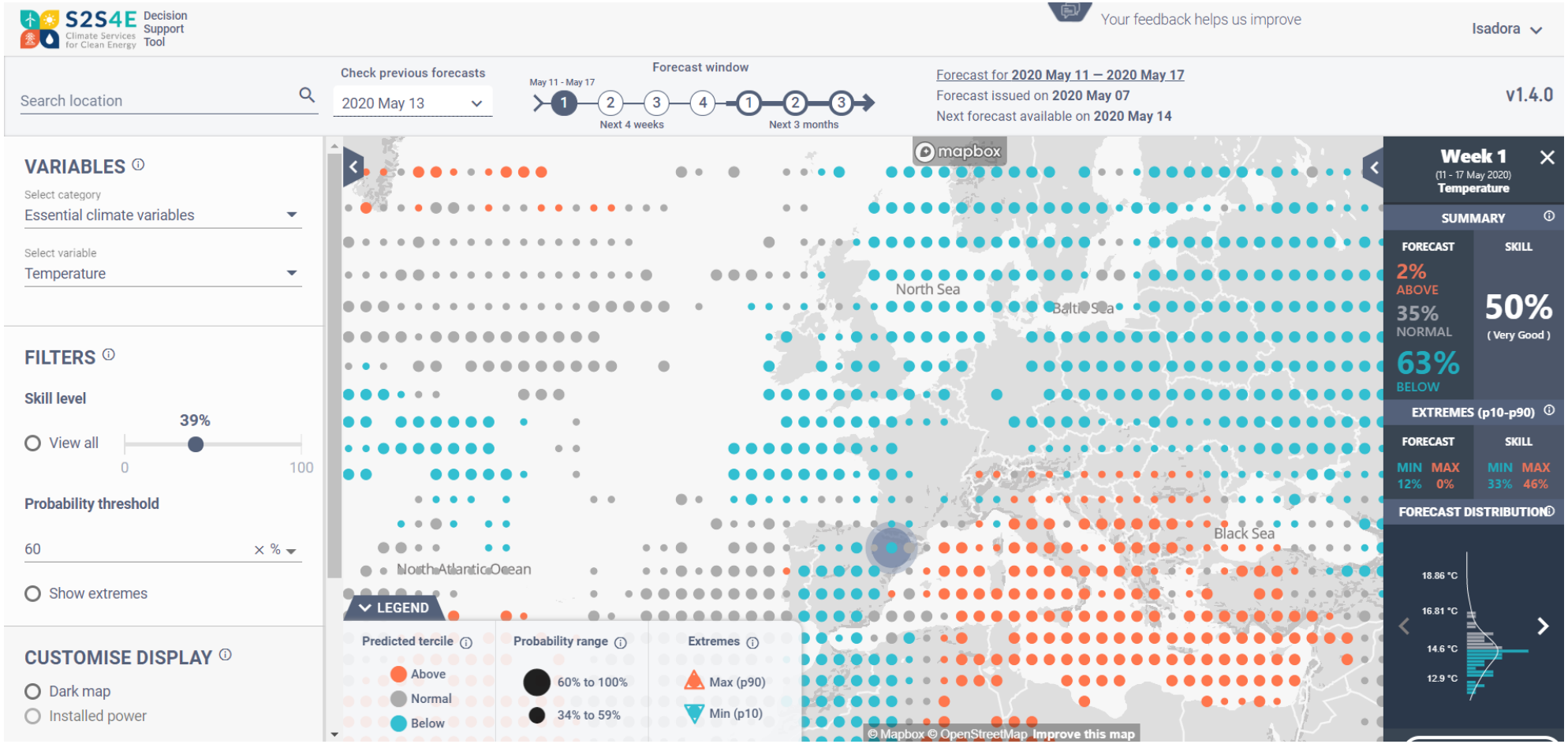
Progressive Disclosure Of information

Interactive Design

S2S4E
Climate Services for Clean Energy

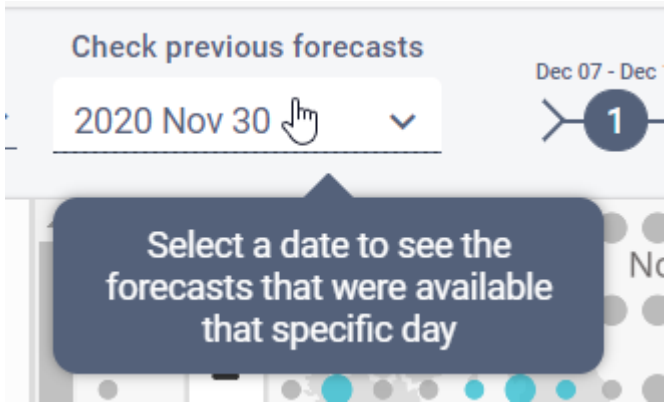
@S2S4E

www.s2s4e.eu/dst

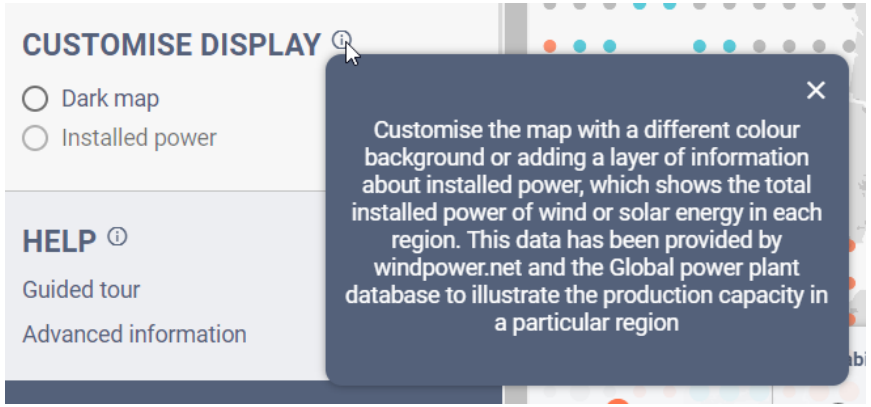


Guiding the User

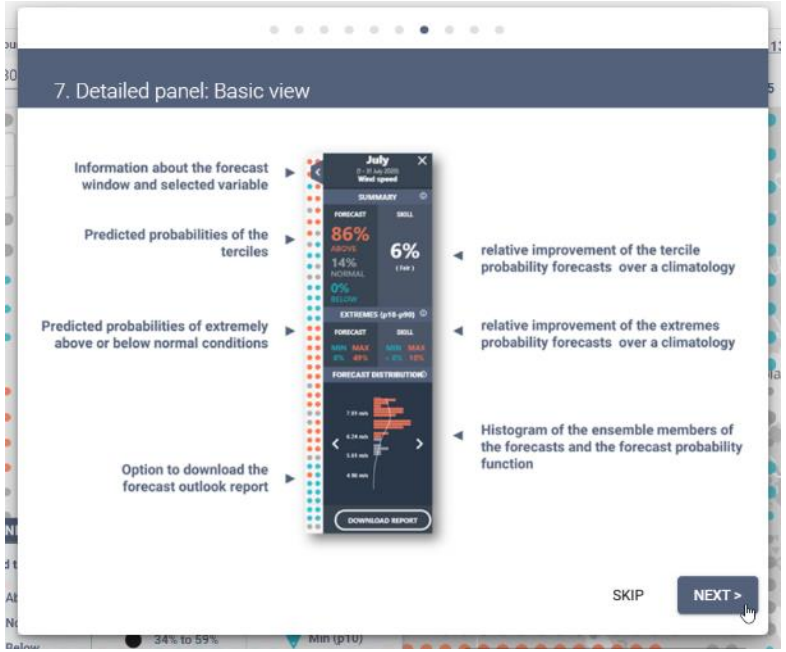
Mouse hover text



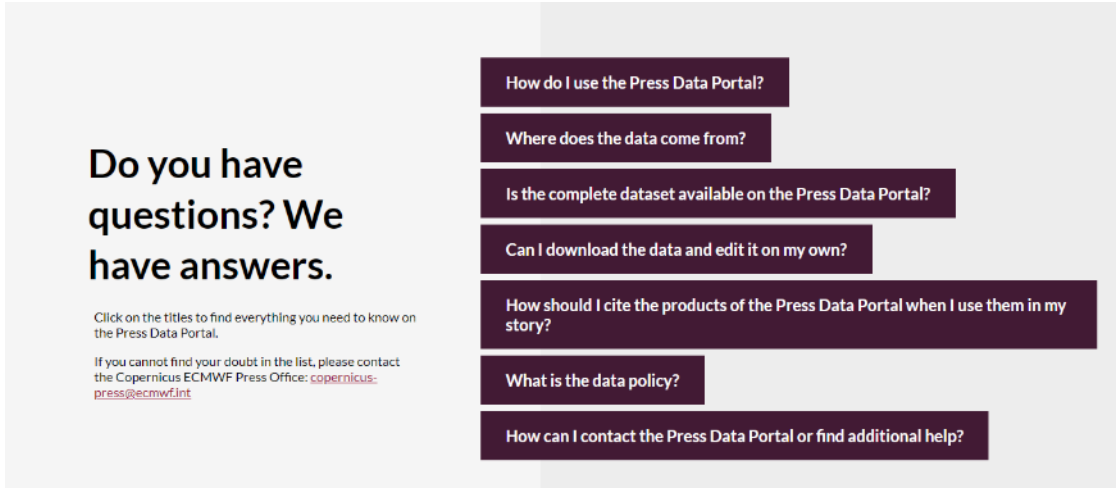
Tooltips



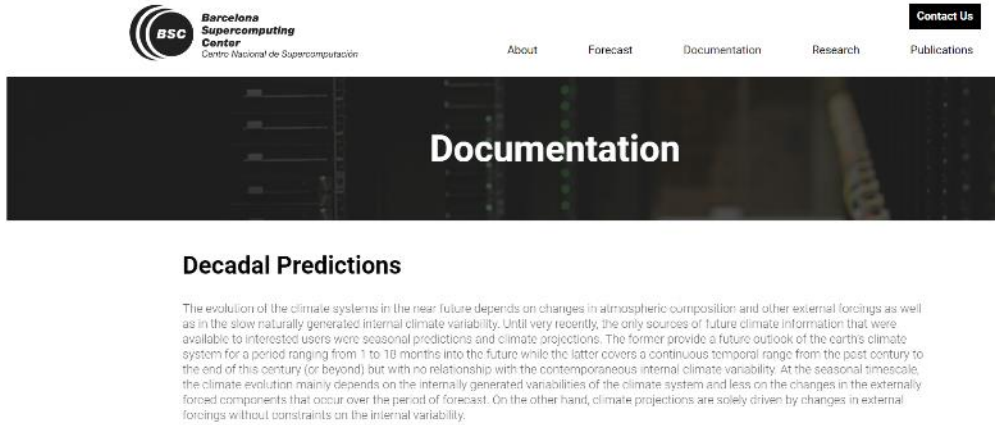
Guided tours



FAQ



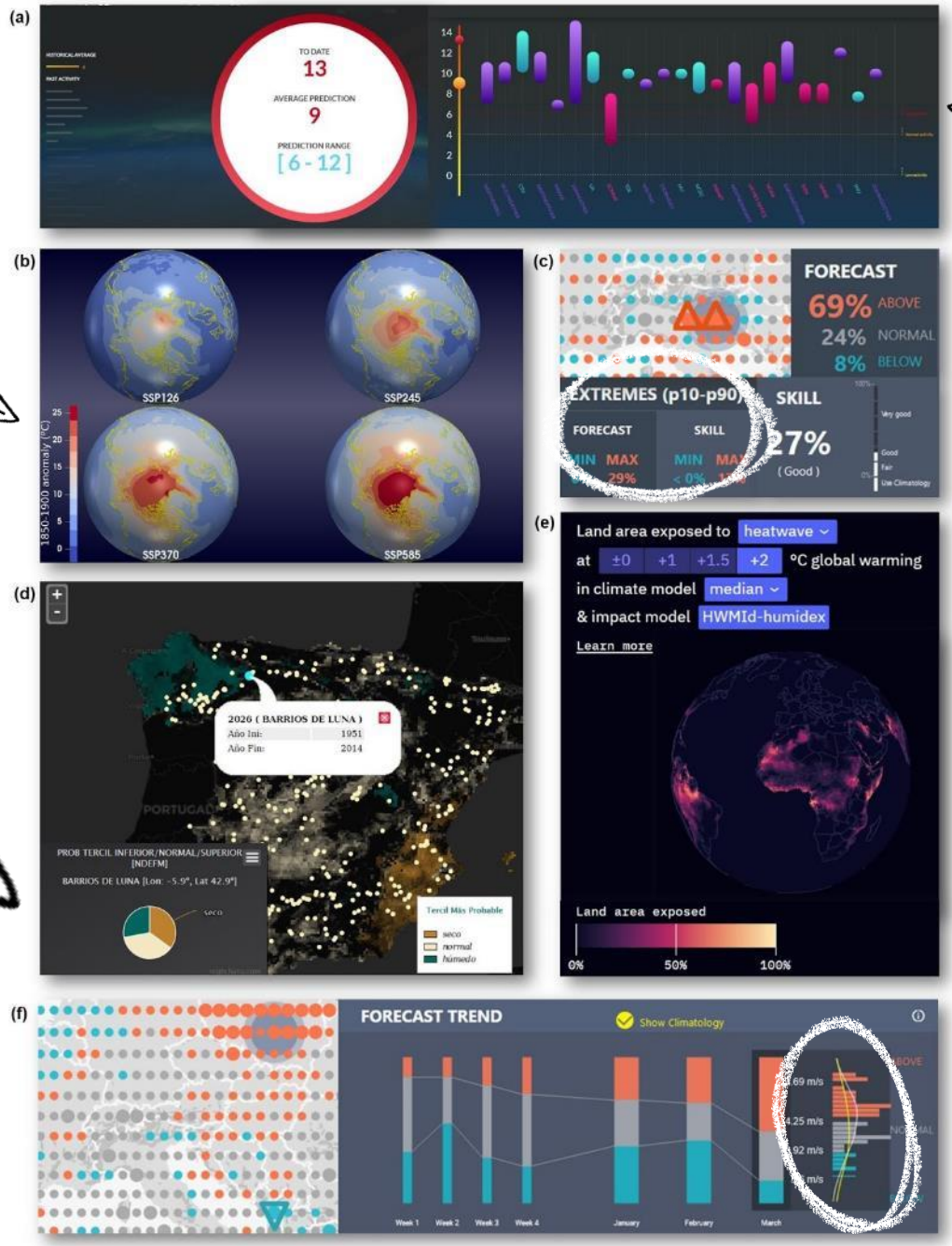
Advanced help and documentation



1. Design
2. Color
3. Visual encoding
4. Interacting with information
5. Uncertainty visualisation

Uncertainty visualisation is a key challenge for Data visualisation and Science

First order uncertainty: e.g. probabilities



anomalies

terciles

average and possible range

extreme events probabilities (e.g. p10 and p90)

scenarios

whole probability distribution function

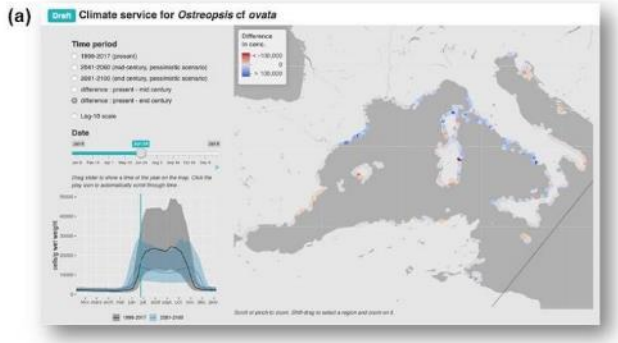
Terrado, M. et al.
https://www.climateurope.eu/10020-2/

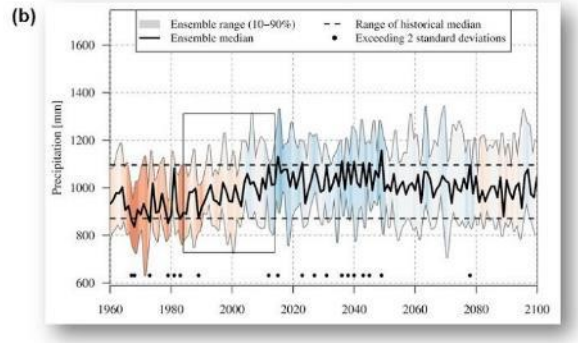
Barcelona Supercomputing Center
Centro Nacional de Supercomputación

Second order uncertainty: e.g. skill, reliability

Terrado, M. et al.
www.climateurope.eu

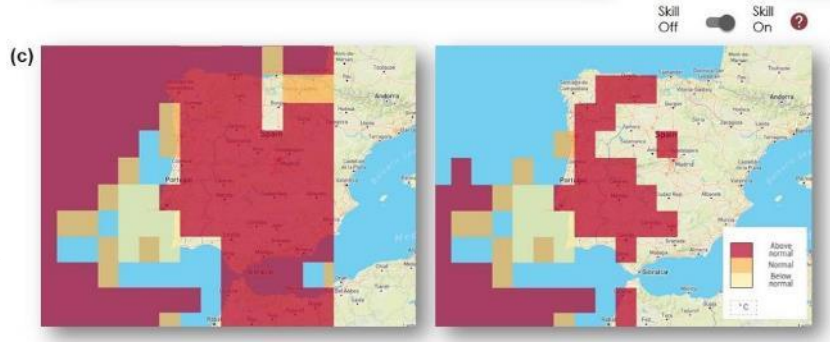
uncertainty not shown



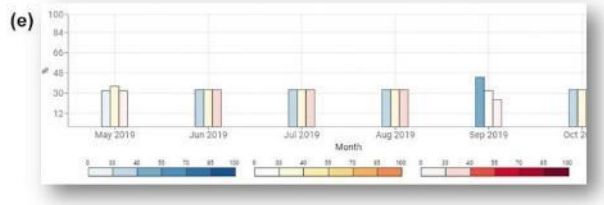


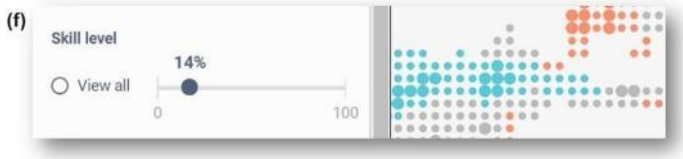
show ensemble range

mask areas with high uncertainty



use visual encoding (e.g. transparency)





use interactive options (e.g. slider)

replace predictions with high uncertainty by the climatology (i.e. average conditions of the past years

THANK YOU

Barcelona Supercomputing Center
Centro Nacional de Supercomputación

EXCELENCIA SEVERO OCHOA

The products displayed in this presentation have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreements nº 689029 (Climateurope), 73004 (Climate-fit.city), 820954 (Digital-Water.city), 641811 (IMPREX), 776467 (MED-GOLD), 641727 (PRIMAVERA), 820712 (RECEIPT), 776787 (S2S4E), 776868 (SECLI-FIRM) and 730253 (VISCA), and have been co-funded by the H2020 ERA-net ERA4CS (690462) as part of the projects CIREG, Clim2power, CoCliME, EVOKED, ISIpedia, MEDSCOPE, SENSES, WATExR. We would also like to thank the participation of the projects SeasonalHurricanePredictions, KNMI-scenarios and eClimViz. Some results shown are part of the Copernicus Climate Change Service (C3S) under contract number: C3S_429g_BSC; and supported by the European Cooperation in Science and Technology (COST) through COST Action inDUST CA16202.
The content of this presentation reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

Isadora Ch. Jiménez
@isadorachristel

Isadora.jimenez@bsc.es